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Refine Search ("component analysis" or pca) and ("genetic" or evol

	PAT. NO.	Title
1	7,171,339	Method and system for analyzing multi-variate data using canonical decomposition
2	7,166,424	Fragments of fluorescent proteins for protein fragment complementation assays
3	7,163,273	Printing cartridge with two dimensional code identification
4	7,155,395	Preprinted print rolls for postal use in an image processing device
5	7,152,939	Printing cartridge with switch array identification
6	7,149,320	Binaural adaptive hearing aid
7	7,144,553	Use of an array of polymeric sensors of varying thickness for detecting analytes in fluids
8	7,140,726	Printing cartridge incorporating print media and an internal feed mechanism
9	7,136,716	Method for providing control to an industrial process using one or more multidimensional variables
10	7,135,616	Biochemistry-related polynucleotides and polypeptides in plants
11	7,130,454	Real-time facial recognition and verification system
12	7,129,095	Method and system for using a weighted response
13	7,128,386	Printer with capacitive printer cartridge data reader
14	7,127,104	Vectorized image segmentation via trixel agglomeration
15	7,124,065	Determining a tangent space and filtering data onto a manifold
16	7,119,836	Print roll for use in a camera imaging system
17	7,117,188	Methods of identifying patterns in biological systems and uses thereof
18	7,116,749	Methods for acquiring multi spectral data of an object
19	7,115,229	Apparatus and method for monitoring molecular species within a medium
20	7,110,139	Printhead controller integrated circuit
21	7,109,001	COBRA gene and uses thereof

22 7,105,301 Detecting molecular binding by monitoring feedback controlled cantilever deflections
23 7,104,958 Systems and methods for investigating intracranial pressure
24 7,100,834 Method of data distribution using ink dots on cards
25 7,097,973 Method for monitoring molecular species within a medium
26 7,097,104 Image manipulation device
27 7,092,011 Camera for printing on media provided on print roll
28 7,089,780 Apparatus, systems and methods for detecting and transmitting sensory data over a computer network
29 7,087,896 Mass spectrometric quantification of chemical mixture components
30 7,084,951 Combined media- and ink-supply cartridge
31 7,083,108 Redundantly encoded data structure for encoding a surface
32 7,073,713 Card having coded data and visible information, for operating a device
33 7,072,770 Method for identifying components of a mixture via spectral analysis
34 7,068,842 System and method for object identification and behavior characterization using video analysis
35 7,062,504 Creating ensembles of oblique decision trees with evolutionary algorithms and sampling
36 7,062,385 Intelligent electro-optical nucleic acid-based sensor array and method for detecting volatile compounds in ambient air
37 7,057,721 Wide field method for detecting pathogenic microorganisms
38 7,055,927 Method of identifying printing cartridge characteristics with capacitive sensors
39 7,054,792 Method, computer program, and system for intrinsic timescale decomposition, filtering, and automated analysis of signals of arbitrary origin or timescale
40 7,054,468 Face recognition using kernel fisherfaces
41 7,052,103 Printing device for use with a printing cartridge having capacitive sensor identification
42 7,050,143 Camera system with computer language interpreter
43 7,044,589 Printing cartridge with barcode identification
44 7,041,063 Noninvasive measurement of chemical substances
45 7,039,621 System, method, and computer program product for representing object relationships in a multidimensional space
46 7,039,446 Indirect measurement of tissue analytes through tissue properties
47 7,033,781 Whole cell engineering by mutagenizing a substantial portion of a starting genome, combining mutations, and optionally repeating
48 7,031,778 Temporary expanding integrated monitoring network
49 7,026,121 Methods and compositions for diagnosing and monitoring transplant rejection
50 7,024,312 Methods for making character strings, polynucleotides and polypeptides having desired characteristics

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	PAT. NO.	Title
51	7,016,885	Self-designing intelligent signal processing system capable of evolutional learning for classification/recognition of one and multidimensional signals
52	7,016,787	Characterizing biological stimuli by response curves
53	7,007,852	Data distribution mechanism in the form of ink dots on cards
54	7,007,035	Parallel object-oriented decision tree system
55	7,006,939	Method and apparatus for low cost signature testing for analog and RF circuits
56	6,999,898	Classification of deviations in a process
57	6,996,549	Computer-aided image analysis
58	6,996,478	Multiple sensing system and device
59	6,996,476	Methods and systems for gene expression array analysis
60	6,994,971	Particle analysis assay for biomolecular quantification
61	6,990,364	Noninvasive measurement of glucose through the optical properties of tissue
62	6,988,056	Signal interpretation engine
63	6,987,564	Automatic correction for continuum background in laser induced breakdown and Raman spectroscopy
64	6,987,001	Methods and compositions using stearoyl-CoA desaturase to identify triglyceride reducing therapeutic agents
65	6,986,562	Printing cartridge with capacitive sensors for identification of characteristics
66	6,985,779	Monitoring system for an industrial process using one or more multidimensional variables
67	6,980,691	Correction of "red-eye" effects in images

68 6,975,944 Method and apparatus for monitoring materials used in electronics
69 6,973,158 Multi-target X-ray tube for dynamic multi-spectral limited-angle CT imaging
70 6,965,816 PFN/TRAC system FAA upgrades for accountable remote and robotics control to stop the unauthorized use of aircraft and to improve equipment management and public safety in transportation
71 6,961,636 Method and apparatus for dynamically monitoring controller tuning parameters
72 6,956,961 Extracting shape information contained in cell images
73 6,954,722 Methods and systems for data analysis
74 6,954,254 Printing cartridge with ink and print media supplies
75 6,953,663 Polymorphism detection
76 6,953,235 Printing cartridge with a data-carrying integrated circuit device
77 6,950,493 Dynamic multi-spectral CT imaging
78 6,950,492 Dynamic multi-spectral X-ray projection imaging
79 6,948,661 Data structure encoded on a surface of an object
80 6,941,287 Distributed hierarchical evolutionary modeling and visualization of empirical data
81 6,919,566 Method of calibrating a spectroscopic device
82 6,918,542 Data distribution mechanism in the form of ink dots on cards
83 6,917,952 Application-specific method and apparatus for assessing similarity between two data objects
84 6,917,845 Method for monitoring environmental condition using a mathematical model
85 6,913,930 Analytical method and apparatus therefor involving continuous titration
86 6,907,436 Method for classifying data using clustering and classification algorithm supervised
87 6,907,369 Method and apparatus for modifying design constraints based on observed performance
88 6,907,280 Method and apparatus for objectively measuring pain, pain treatment and other related techniques
89 6,883,364 Portable sensor
90 6,882,992 Neural networks for intelligent control
91 6,882,990 Methods of identifying biological patterns using multiple data sets
92 6,879,729 Parallel object-oriented, denoising system using wavelet multiresolution analysis
93 6,879,341 Digital camera system containing a VLIW vector processor
94 6,876,760 Classifying cells based on information contained in cell images
95 6,874,364 System for monitoring mechanical waves from a moving machine
96 6,865,509 System for providing control to an industrial process using one or more multidimensional variables
97 6,857,719 Printing cartridge with pressure sensor array identification
98 6,853,920 Control for an industrial process using one or more multidimensional variables
99 6,850,274 Image texture mapping camera
100 6,839,636 Multiple sensing system and device

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	PAT. NO.	Title
101	6,837,095	Apparatus, systems and methods for detecting and transmitting sensory data over a computer network
102	6,836,240	Waveform synthesis for imaging and ranging applications
103	6,835,927	Mass spectrometric quantification of chemical mixture components
104	6,834,237	Method and system for classifying a biological sample
105	6,833,247	Regulated prostate cancer genes
106	6,831,681	Preprinted print rolls for use in an image processing device
107	6,828,933	Waveform synthesis for imaging and ranging applications
108	6,826,300	Feature based classification
109	6,825,800	Waveform synthesis for imaging and ranging applications
110	6,819,787	Robust stain detection and quantification for histological specimens based on a physical model for stain absorption
111	6,816,605	Methods and systems for biometric identification of individuals using linear optical spectroscopy
112	6,805,863	Methods of modulating immune coagulation
113	6,803,989	Image printing apparatus including a microcontroller
114	6,789,069	Method for enhancing knowledge discovered from biological data using a learning machine
115	6,788,336	Digital camera with integral color printer and modular replaceable print roll
116	6,786,420	Data distribution mechanism in the form of ink dots on cards
117	6,760,715	Enhancing biological knowledge discovery using multiples support vector machines

118 6,759,010 Use of an array of polymeric sensors of varying thickness for detecting analytes in fluids
119 6,750,944 Programmable camera system with software interpreter
120 6,750,901 Digital instant printing camera with image processing capability
121 6,746,960 Electronic techniques for analyte detection
122 6,745,156 Petroleum exploration and prediction apparatus and method
123 6,743,599 Compositions and assays utilizing ADP or phosphate for detecting protein modulators
124 6,714,925 System for identifying patterns in biological data using a distributed network
125 6,713,258 Methods for genotyping by hybridization analysis
126 6,713,257 Gene discovery using microarrays
127 6,703,241 Referencing and rapid sampling in artificial olfactometry
128 6,702,417 Printing cartridge with capacitive sensor identification
129 6,701,026 Method and apparatus for cancelling lighting variations in object recognition
130 6,691,045 Method for determining discrete quantitative structure activity relationships
131 6,690,817 Spectral bio-imaging data for cell classification using internal reference
132 6,683,455 Methods for spectral analysis and their applications: spectral replacement
133 6,681,132 Sodium magnetic reasonance imaging used in diagnosing tumors and assessing response to treatment
134 6,680,369 Motor proteins and methods for their use
135 6,678,413 System and method for object identification and behavior characterization using video analysis
136 6,678,398 Dual mode real-time screening and rapid full-area, selective-spectral, remote imaging and analysis device and process
137 6,675,164 Parallel object-oriented data mining system
138 6,675,103 Visualizing high dimensional descriptors of molecular structures
139 6,671,056 Method and system for optical spectrum analysis with a depolarized local oscillator signal
140 6,665,454 Dot adjacency compensation in optical storage systems using ink dots
141 6,658,915 Portable sensor
142 6,644,771 Printing cartridge with radio frequency identification
143 6,636,216 Digital image warping system
144 6,631,333 Methods for remote characterization of an odor
145 6,628,821 Canonical correlation analysis of image/control-point location coupling for the automatic location of control points
146 6,627,154 Electronic techniques for analyte detection
147 6,620,621 Method for the detection of cellular abnormalities using fourier transform infrared spectroscopy
148 6,618,140 Spectral deconvolution of fluorescent markers
149 6,618,117 Image sensing apparatus including a microcontroller
150 6,610,367 Use of an array of polymeric sensors of varying thickness for detecting analytes in fluids

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	PAT. NO.	Title
151	6,586,186	Polymorphism detection
152	6,577,754	Robust stain detection and quantification for histological specimens based on a physical model for stain absorption
153	6,570,608	System and method for detecting interactions of people and vehicles
154	6,565,181	Printing cartridge with switch array identification
155	6,560,352	Apparatus and method of biometric identification or verification of individuals using optical spectroscopy
156	6,558,955	Methodology for predicting and/or diagnosing disease
157	6,556,853	Spectral bio-imaging of the eye
158	6,548,270	DNA encoding human acid-sensing ion channel BNaC4 (ASIC4)
159	6,547,364	Printing cartridge with an integrated circuit device
160	6,546,378	Signal interpretation engine
161	6,544,193	Noninvasive measurement of chemical substances
162	6,542,645	Adaptive tracking of dots in optical storage system using ink dots
163	6,537,211	Flourescence imaging endoscope
164	6,503,719	Methods and apparatus for detecting polynucleotide hybridization
165	6,496,813	Classifying apparatus using a combination of statistical methods and neuronal networks, designed in particular for odour recognition
166	6,495,341	Method and apparatus for monitoring a physical or chemical conversion of a grain material
167	RE37,933	Viral vectors and their use for treating hyperproliferative disorders, in particular restenosis

168 6,493,637 Coincidence detection method, products and apparatus
169 6,476,863 Image transformation means including user interface
170 6,459,495 Dot center tracking in optical storage systems using ink dots
171 6,453,246 System, method, and computer program product for representing proximity data in a multi-dimensional space
172 6,450,008 Food applications of artificial olfactometry
173 6,442,525 System for authenticating physical objects
174 6,438,409 Methods of characterizing ventricular operations and applications thereof
175 6,431,669 Method and apparatus for information storage in a portable print roll
176 6,424,859 Diagnosis of rheumatoid arthritis in vivo using a novel spectroscopic approach
177 6,422,061 Apparatus, systems and methods for detecting and transmitting sensory data over a computer network
178 6,421,614 Photometer system for obtaining reliable data
179 6,419,361 Spectral bio-imaging of the eye
180 6,418,783 Handheld sensing apparatus
181 6,416,154 Printing cartridge with two dimensional code identification
182 6,415,054 Target detection for dot region alignment in optical storage systems using ink dots
183 6,410,254 Compositions and assays utilizing ADP or phosphate for detecting protein modulators
184 6,405,065 Non-invasive in vivo tissue classification using near-infrared measurements
185 6,403,089 Methods of modulating immune coagulation
186 6,400,828 Canonical correlation analysis of image/control-point location coupling for the automatic location of control points
187 6,387,329 Use of an array of polymeric sensors of varying thickness for detecting analytes in fluids
188 6,379,929 Chip-based isothermal amplification devices and methods
189 6,362,869 Authentication system for camera print rolls
190 6,362,868 Print media roll and ink replaceable cartridge
191 6,356,715 Prints remaining indicating for camera with variable length print capability
192 6,341,629 Testing device and method of use
193 6,339,950 Process for determining the number of components in peaks, bands, and signals of chromatograms, electrograms, and spectrograms
194 6,333,501 Methods, apparatus, and articles of manufacture for performing spectral calibration
195 6,317,192 Utilization of image tiling effects in photographs
196 6,315,200 Encoded data card reading system
197 6,300,063 Polymorphism detection
198 6,297,018 Methods and apparatus for detecting nucleic acid polymorphisms
199 6,276,798 Spectral bio-imaging of the eye
200 6,251,615 Cell analysis methods

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Refine Search ("component analysis" or pca) and ("genetic" or evol

	PAT. NO.	Title
201	6,236,047	Method for multi-spectral analysis of organic blood analytes in noninvasive infrared spectroscopy
202	6,234,006	Handheld sensing apparatus
203	6,223,133	Method for optimizing multivariate calibrations
204	6,217,165	Ink and media cartridge with axial ink chambers
205	6,212,824	Methods for classifying plants for evaluation and breeding programs by use of remote sensing and image analysis technology
206	6,200,798	Defective recombinant adenoviruses with inactivated IVa2 gene
207	6,198,532	Spectral bio-imaging of the eye
208	6,146,897	Method for the detection of cellular abnormalities using Fourier transform infrared spectroscopy
209	6,122,042	Devices and methods for optically identifying characteristics of material objects
210	6,103,199	Capillary electroflow apparatus and method
211	6,085,576	Handheld sensing apparatus
212	6,066,459	Method for simultaneous detection of multiple fluorophores for in situ hybridization and multicolor chromosome painting and banding
213	6,055,325	Color display of chromosomes or portions of chromosomes
214	6,051,559	Cloning and characterizing of genes associated with long-term memory
215	6,040,578	Method and apparatus for multi-spectral analysis of organic blood analytes in noninvasive infrared spectroscopy
216	6,035,246	Method for identifying known materials within a mixture of unknowns
217	6,018,587	Method for remote sensing analysis be decorrelation statistical analysis and hardware therefor
218	6,017,390	Growth of oriented crystals at polymerized membranes

219 6,015,667 Multicomponent analysis method including the determination of a statistical confidence interval
220 5,945,676 Method and apparatus for multi-spectral analysis in noninvasive NIR spectroscopy
221 5,936,731 Method for simultaneous detection of multiple fluorophores for in situ hybridization and chromosome painting
222 5,931,779 Real-time in-vivo measurement of myoglobin oxygen saturation
223 5,926,773 System for identifying known materials within a mixture of unknowns
224 5,912,165 Method for chromosome classification by decorrelaiton statistical analysis and hardware therefore
225 5,906,919 Method for chromosomes classification
226 5,871,946 Method for determining activity of enzymes in metabolically active whole cells
227 5,871,908 Process for the determination of in vitro amplified nucleic acids
228 5,857,462 Systematic wavelength selection for improved multivariate spectral analysis
229 5,851,521 Viral vectors and their use for treating hyperproliferative disorders, in particular restenosis
230 5,849,513 Assay reagent
231 5,834,203 Method for classification of pixels into groups according to their spectra using a plurality of wide band filters and hardwire therefore
232 5,822,742 Dynamically stable associative learning neural network system
233 5,817,462 Method for simultaneous detection of multiple fluorophores for in situ hybridization and multicolor chromosome painting and banding
234 5,812,930 Information handling systems with broadband and narrowband communication channels between repository and display systems
235 5,804,203 Topical product formulations containing strontium for reducing skin irritation
236 5,798,262 Method for chromosomes classification
237 5,784,162 Spectral bio-imaging methods for biological research, medical diagnostics and therapy
238 5,776,720 Assay reagent
239 5,764,819 Methods for classifying plants for evaluation and breeding programs by use of remote sensing and image analysis technology
240 5,752,007 System and method using separators for developing training records for use in creating an empirical model of a process
241 5,747,806 Method and apparatus for multi-spectral analysis in noninvasive nir spectroscopy
242 5,733,719 Method of making an assay compound
243 5,727,128 System and method for automatically determining a set of variables for use in creating a process model
244 5,719,024 Method for chromosome classification by decorrelation statistical analysis and hardware therefore
245 5,698,411 Method for determining activity of enzymes in metabolically active whole cells
246 5,435,309 Systematic wavelength selection for improved multivariate spectral analysis
247 5,424,959 Interpretation of fluorescence fingerprints of crude oils and other hydrocarbon mixtures using neural networks
248 5,361,628 System and method for processing test measurements collected from an internal combustion engine for diagnostic purposes
249 5,166,747 Apparatus and method for analyzing the composition of formation fluids
250 4,994,671 Apparatus and method for analyzing the composition of formation fluids

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1. **Artificial-intelligence approach for biomedical sample characterization using Raman spectro**
Zhengmao Ye;
Automation Science and Engineering, IEEE Transactions on [see also Robotics and Automation, IE
Volume 2, Issue 1, Jan. 2005 Page(s):67 - 73
Digital Object Identifier 10.1109/TASE.2004.840071
AbstractPlus | References | Full Text: PDF(544 KB) IEEE JNL
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2. **Genetic algorithm based independent component analysis to separate noise from Electroca**
Palaniappan, R.; Gupta, C.N.;
Engineering of Intelligent Systems, 2006 IEEE International Conference on
22-23 April 2006 Page(s):1 - 5
AbstractPlus | Full Text: PDF(1456 KB) IEEE CNF
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3. **Independent component analysis using time delayed sampling**
Yoshioka, M.; Omatu, S.;
Neural Networks, 2000. IJCNN 2000, Proceedings of the IEEE-INNS-ENNS International Joint Con
Volume 4, 24-27 July 2000 Page(s):75 - 78 vol.4
Digital Object Identifier 10.1109/IJCNN.2000.860752
AbstractPlus | Full Text: PDF(212 KB) IEEE CNF
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4. **Identification of probabilistic cellular automata**
Billings, S.A.; Yingxu Yang;
Systems, Man and Cybernetics, Part B, IEEE Transactions on
Volume 33, Issue 2, April 2003 Page(s):225 - 236
Digital Object Identifier 10.1109/TSMCB.2003.810437
AbstractPlus | References | Full Text: PDF(882 KB) IEEE JNL
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5. **Signal separation method using ICA**
Yoshioka, M.; Omatu, S.;
Systems, Man, and Cybernetics, 1999, IEEE SMC '99 Conference Proceedings, 1999 IEEE Interna
Volume 1, 12-15 Oct. 1999 Page(s):549 - 552 vol.1
Digital Object Identifier 10.1109/ICSMC.1999.814151
AbstractPlus | Full Text: PDF(244 KB) IEEE CNF
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6. **Non-stationary independent component analysis**
Everson, R.; Roberts, S.J.;

Artificial Neural Networks, 1999. ICANN 99. Ninth International Conference on (Conf. Publ. No. 47(
Volume 1, 7-10 Sept. 1999 Page(s):503 - 508 vol.1

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1 Real-world applications: papers: Evolutionary optimization of ZIP60: a controlled explosion in hyperspace

Dave Cliff

July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary computation GECCO '06**

Publisher: ACM Press

Full text available: pdf(346.20 KB) Additional Information: full citation, abstract, references, index terms

The "ZIP" adaptive trading algorithm has been demonstrated to outperform human traders in experimental studies of continuous double auction (CDA) markets. The original ZIP algorithm requires the values of eight control parameters to be set correctly. A new extension of the ZIP algorithm, called ZIP60, requires the values of 60 parameters to be set correctly. ZIP60 is shown here to produce significantly better results than the original ZIP (called "ZIP8" hereafter). A genetic algorithm (GA) is us ...

Keywords: ZIP8 ZIP60, Zero-Intelligence-Plus (ZIP) Traders, algorithmic trading, auction markets, automated market-mechanism design

2 Real world applications: Nonlinear feature extraction using a neuro genetic hybrid

Yung-Keun Kwon, Byung-Ro Moon

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available: pdf(361.05 KB) Additional Information: full citation, abstract, references, citings, index terms

Feature extraction is a process that extracts salient features from observed variables. It is considered a promising alternative to overcome the problems of weight and structure optimization in artificial neural networks. There were many nonlinear feature extraction methods using neural networks but they still have the same difficulties arisen from the fixed network topology. In this paper, we propose a novel combination of genetic algorithm and feedforward neural networks for nonlinear feature ...

Keywords: feature extraction, function approximation, neuro-genetic hybrid

3 Evolvable hardware: papers: Evolutionary design of fault-tolerant analog control for a piezoelectric pipe-crawling robot

Geoffrey A. Hollinger, David A. Gwaltney

July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary**

computation GECCO '06
Publisher: ACM Press
Full text available: pdf(418.13 KB) Additional Information: full citation, abstract, references, index terms

In this paper, a genetic algorithm (GA) is used to design fault-tolerant analog controllers for a piezoelectric micro-robot. First-order and second-order functions are developed to model the robot's piezoelectric actuators, and the GA is used to evolve closed-loop controllers for both models. The GA is first used to assist in traditional PID design and is later used to synthesize variable topology analog controllers. Through the use of a compact circuit representation, runtimes are minimized and ...

Keywords: evolvable hardware, genetic algorithms, inspection robots, piezoelectric actuators, robot control

4 Genetic programming: Open-ended robust design of analog filters using genetic programming
Jianjun Hu, Xiwei Zhong, Erik D. Goodman
June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**
Publisher: ACM Press
Full text available: pdf(653.64 KB) Additional Information: full citation, abstract, references, index terms

Most existing research on robust design using evolutionary algorithms (EA) follows the paradigm of traditional robust design, in which parameters of a design solution are tuned to improve the robustness of the system. However, the topological structure of a system may set a limit on the possible robustness achievable through parameter tuning. This paper proposes a new robust design paradigm that exploits the open-ended topological synthesis capability of genetic programming to evolve more robust ...

Keywords: analog filter synthesis, automated design, bond graphs, genetic programming, robust design

5 Poster session: FPGA-based design of an evolutionary controller for collision-free robot navigation
M. A. H. B. Azhar, K. R. Dimond
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

The employment of field programmable gate arrays (FPGAs) to a robot controller is very attractive, since it allows for fast IC prototyping and low cost modifications. The speedup is achieved because of pipelining and dedicated functions in hardware that are customized to the problem. The self learning ability and the adaptive nature of an Artificial Neural Network (ANN) makes it a good candidate for the control structure of a robot's navigation. An evolutionary approach in designing robots can e ...

6 Poster session: A single-FPGA implementation of image connected component labelling
K. Benkrid, S. Sukhsawas, D. Crookes, S. Belkacemi
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

This paper describes an architecture based on a serial iterative algorithm for Image Connected Component Labelling with a hardware complexity O(N) for an NxN image. The algorithm iteratively scans the input image, performing a recursive non-zero maximum neighbourhood operation. A complete forward pass is followed by an inverse pass in which

the image is scanned in reverse order. The process is repeated until no change in the image occurs. The algorithm has been coded in Handel C language and tar ...

7 Contributed articles: Genetic subtyping using cluster analysis

Tom Burr, James R. Gattiker, Greggory S. LaBerge

July 2001 **ACM SIGKDD Explorations Newsletter**, Volume 3 Issue 1

Publisher: ACM Press

Full text available: pdf(984.40 KB) Additional Information: full citation, abstract, references

In this paper we (1) describe state-of-the-art methods to identify clusters in DNA sequence data for taxonomic analysis; (2) describe a new method with better scaling properties based on model-based clustering, and (3) present examples using the nucleoprotein and hemagglutin regions of influenza and the *env* and *gag* regions of human immunodeficiency virus (HIV).

Keywords: DNA sequence analysis, HIV, influenza, model-based clustering, phylogenetic trees

8 Genetic algorithms: On favoring positive correlations between form and quality of candidate solutions via the emergence of genomic self-similarity

Ivan Garibay, Annie S. Wu, Ozlem Garibay

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available: pdf(240.49 KB) Additional Information: full citation, abstract, references, citings, index terms

A key property for the effectiveness of stochastic search techniques, including evolutionary algorithms, is the existence of a positive correlation between the form and the quality of candidate solutions. In this paper, we show that when the ordering of genomic symbols in a genetic algorithm is completely independent of the fitness function and therefore free to evolve along the candidate solutions it encodes, the resulting genomes self-organize into self-similar structures that favor this key s ...

Keywords: emergence, genetic algorithm, genomic self-similarity, proportional genetic algorithm, representation, self-organization

9 Learning Classifier systems and other genetics-based machine learning: papers: Prediction update algorithms for XCSF: RLS, Kalman filter, and gain adaptation

Pier Luca Lanzi, Daniele Loiacono, Stewart W. Wilson, David E. Goldberg

July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary computation GECCO '06**

Publisher: ACM Press

Full text available: pdf(189.57 KB) Additional Information: full citation, abstract, references, index terms

We study how different prediction update algorithms influence the performance of XCSF. We consider three classical parameter estimation algorithms (NLMS, RLS, and Kalman filter) and four gain adaptation algorithms (K1, K2, IDBD, and IDD). The latter have been shown to perform comparably to the best algorithms (RLS and Kalman), but they have a lower complexity. We apply these algorithms to update classifier prediction in XCSF and compare the performances of the seven versions of XCSF on a set of ...

Keywords: Kalman filter, LCS, XCS, prediction update

10 Crowd and group animation

Daniel Thalmann, Christophe Hery, Seth Lippman, Hiromi Ono, Stephen Regelous, Douglas Sutton

August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**
Publisher: ACM Press
Full text available: pdf(20.19 MB) Additional Information: full citation, abstract

A continuous challenge for special effects in movies is the production of realistic virtual crowds, in terms of rendering and behavior. This course will present state-of-the-art techniques and methods. The course will explain in details the different approaches to create virtual crowds: particle systems with flocking techniques using attraction and repulsion forces, copy and pasting techniques, agent-based methods. The architecture of software tools will be presented including the MASSIVE softwa ...

11 Evolutionary hardware: Evolving analog controllers for correcting thermoacoustic instability in real hardware

Saranyan A. Vigraham, John C. Gallagher, Sanjay K. Boddhu
June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**
Publisher: ACM Press
Full text available: pdf(566.93 KB) Additional Information: full citation, abstract, references, index terms

Previous research demonstrated that Evolvable Hardware (EH) techniques can be employed to suppress Thermoacoustic (TA) instability in a computer simulated combustion chamber. Though that work established basic feasibility, there were still significant questions concerning whether those techniques would function in the real world. This paper presents the results of the next incremental step between controlling in pure simulation and controlling a real combustion chamber. In it, we will examine is ...

Keywords: evolvable hardware

12 On genetic algorithms

Eric B. Baum, Dan Boneh, Charles Garrett
July 1995 **Proceedings of the eighth annual conference on Computational learning theory COLT '95**
Publisher: ACM Press
Full text available: pdf(1.13 MB) Additional Information: full citation, references, citings, index terms

13 Poster session: A SC-based novel configurable analog cell

Binlin Guo, Jiarong Tong
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

This paper presents a high performance Configurable Analog Cell (CAC) which is made up of a Basic Configurable Analog Cell (BCAC) and a digital converter block. The CAC can be used either for Field Programmable Analog Array (FPAA) or for Field Programmable Digital-Analog Mixed Array (FPMA). The BCAC include three innovative Programmable Switch Blocks (PSBs), three Programmable Capacitor Arrays (PCAs), and an amplifier. PSB and PCA can be programmed to generate many equivalent components. In addi ...

14 Poster session: Testing for bit error rate in FPGA communication interfaces

Yongquan Fan, Zeljko Zilic
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

FPGAs have witnessed an increased use of dedicated communication interfaces. With their increased use, it is becoming critical to test and properly characterize all such interfaces.

Bit error rate (BER) characteristic is one of the basic measures of the performance of any digital communication system. We propose a scheme for BER testing in FPGAs, which exhibits a few orders of magnitude speedup compared to traditional software simulation methods. In this scheme, we include a novel implementation ...

15 Poster session: An FPGA architecture with built-in error correction capability

P. K. Lala, B. Kiran Kumar
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

The use of very deep submicron technology makes VLSI-based digital systems more susceptible to transient or soft errors, and thus compromises their reliability. This paper proposes an FPGA architecture inspired by the human immune system that allows tolerance of transient errors. The architecture is composed of a two-dimensional array of identical functional cells with different genetic codes. These codes are chosen based on the required functions to be performed by the functional cells. An erro ...

16 Poster session: FPGAs in critical hardware/software systems

Adrian J. Hilton J. Adrian J. Hilton, Gemma Townson, Jon G. Hall
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

FPGAs are being used in increasingly complex roles in critical systems, interacting with conventional critical software. Established safety standards require rigorous justification of safety and correctness of the conventional software in such systems. Newer standards now make similar requirements for safety-related electronic hardware, such as FPGAs, in these systems. In this paper we examine the current state-of-the-art in programming FPGAs, and their use in conventional (low-criticality) hard ...

17 Poster session: Design framework for the implementation of the 2-D orthogonal discrete wavelet transform on FPGA

A. Benkrid, D. Crookes, K. Benkrid
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract, citings

This paper gives a design framework for the implementation of the 2-D Orthogonal Discrete Wavelet Transform (DWT) on FPGA. The architecture is based on the Pyramid Algorithm Analysis. Our architecture spatially maps the multistage filter banks of the DWT onto the Xilinx Virtex-E FPGA family. In this paper we propose a novel FIR structure to handle the computation along the borders using symmetric extension. The paper includes a new detailed mathematical approach to determine the architecture's d ...

18 Poster session: Lattice adaptive filter implementation for FPGA

Zdenek Pohl, Rudolf Matoušek, Jirí Kadlec, Milan Tichý, Miroslav Lícko
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Our poster introduces an innovative RLS Lattice filter implementation for FPGAs. The signal processing applications typically require wide numeric range, and that poses a problem when using an FPGA implementation. Our approach is based on arithmetic using logarithmic numeric representation (LNS). The test application - an adaptive noise canceller - has been optimized for the Xilinx Virtex devices. It consumes roughly 70% of all logic resources of the XCV800 device and all block memory cells. The ...

19 Poster session: A high-speed successive erasure BCH decoder architecture

Thomas Buerner
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

A new high speed architecture for a BCH successive erasure decoder is presented. The Berlekamp-Massey based decoder by Sarwate and Shanbhag is extended to handle successive erasures. The critical path in the calculation submodules is increased from Tadd+Tmult to Tadd+Tmult+Tmux. The proposed architecture is implemented exemplary for a BCH(63,45,7) code with up to two erasures on a XILINX Spartan2E300-7. Thus a clock frequency of 95 MHz is reached using 47% of the available slices instead of 105 ...

20 Poster session: A physical retiming algorithm for field programmable gate arrays (abstract only)

Peter Suaris, Dongsheng Wang, Pei-Ning Guo, Nan-Chi Chou
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

In this paper, we present a physical retiming algorithm for sequential circuits implemented in field programmable gate arrays (FPGAs). This algorithm can speed up the sequential circuits by reducing delay of all critical paths with negative slacks. By taking advantage of the physical information provided by placed circuits, this algorithm integrates two operations: retiming and register duplication. Retiming moves registers across combinational components. Register duplication moves registers ac ...

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Relevance scale

21 Poster session: An estimation and exploration methodology from system-level specifications: application to FPGAs

Sebastien Bilavarn, Guy Gogniat, Jean Luc Philippe
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract, citings

Rapid evaluation and design space exploration from early specifications are important issues in the design cycle. We propose an original area vs. delay estimation methodology that targets reconfigurable architectures. Two main steps compose the estimation flow: i) structural estimations where architectural solutions are defined at the RT level, this step is technological independent and performs an automatic design space exploration and ii) physical estimations which perform technology mapping t ...

22 Introduction & overview of "artificial life"—evolving intelligent agents for modeling & simulation

A. Martin Wildberger
November 1996 **Proceedings of the 28th conference on Winter simulation WSC '96**
Publisher: ACM Press, IEEE Computer Society
Full text available: pdf(987.66 KB) Additional Information: full citation, abstract, references

"Artificial Life," despite its biological analogy and the hyperbole that its name implies, is really a collection of methods for building discrete event simulations with evolving multiple agents. It consists mainly of representing parts of systems or natural phenomena as individual active objects that may be both persistent and self-modifiable, operating on them with genetic algorithms or other evolutionary computing techniques and treating their multi-dimensional parameter (state) space discret ...

23 Poster session: A four-bit full adder implemented on fast SiGe FPGAs with novel power control scheme

K. Zhou, M. Chu, C. You, J.-R. Guo, Channakeshav, J. Mayega, B. S. Goda, R. P. Kraft, J. F. McDonald
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

The low operating speed of current CMOS Field Programmable Gate Arrays (FPGAs), i.e., 10-220 MHz, has prevented their use in high-speed digital applications. With the advent of IBM Silicon Germanium (SiGe) 7HP technology, designers have been able to design FPGAs

operating in the gigahertz range. This paper is going to elaborate on the implementation of a 4-bit ripple-carry full adder (FA) on the new SiGe FPGA with new architectures and a novel power management strategy. The 1-bit FA can be reali ...

24 Poster session: A high resolution diagnosis technique for open and short defects in FPGA interconnects

Mehdi Baradaran Tahoori

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

A two-step diagnosis flow, coarse-grain and fine-grain, is presented in order to identify a faulty element in the FPGA interconnects. The fault models used for interconnect are open, resistive-open, and bridging fault. The coarse-grain phase identifies the faulty net, the routing between two consecutive sequential elements in the FPGA. This phase is performed by just post-processing tester results for the test configurations used for interconnect testing. During the fine-grain step, the faulty n ...

25 Poster session: Application-dependent testing of FPGAs for bridging faults

Mehdi Baradaran Tahoori

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

A new technique is presented for testing for bridging faults in the interconnects of an arbitrary design implemented in an FPGA. The configuration of the routing resources used in the original design remains unchanged in the test configurations. Only the logic blocks used in the design are reprogrammed in order to implement single-term functions, logic functions with only one minterm or one maxterm. As shown by formal proofs, all activated faults are detected when single-term functions and appro ...

26 Poster session: Design strategies and modified descriptions to optimize cipher FPGA implementations: fast and compact results for DES and triple-DES

Gaël Rouvroy, Francois-Xavier Standaert, Jean-Jacques Quisquater, Jean-Didier Legat

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract, citings

We propose a new mathematical DES description that allows optimized implementations. It also provides the best DES and triple-DES FPGA implementations known in term of ratio throughput/area, where area means the number of FPGA slices used. First, we get a less resource consuming unrolled DES implementation that works at data rates of 21.3 Gbps (333 MHz), using VIRTEX II technology. In this design, the plaintext, the key and the mode (encryption/decrytion) can be changed on a cycle-by-cycle basis ...

27 Poster session: Wireless sensor networks: a power-scalable motion estimation IP for hybrid video coding

Federico Quaglio, Maurzio Martina, Fabrizio Vacca, Guido Masera, Andrea Molino, Gianluca Piccinini, Maurizio Zamboni

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Wireless Sensor Networks are an emerging phenomenon in the research community. The design and development of network architectures and nodes implementation are fostering many research activities. Due to their wide application fields and pervasive employment possibilities, the investigation of novel classes of wireless sensor nodes is of great concern.

In this paper we presented a novel Power-Scalable Motion Estimation IP suitable for video-surveillance over Wireless Sensor Networks. The proposed ...

28 Poster session: Synthetic circuit generation using clustering and iteration

Paul D. Kundarewich, Jonathan Rose

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

The development of next-generation CAD tools and FPGA architectures requires benchmark circuits to experiment with new algorithms and architectures. There has always been a shortage of good public benchmarks for these purposes, and even companies that have access to proprietary customer designs could benefit from designs that meet size and other particular specifications. In this paper, we present a new method of generating realistic synthetic benchmark circuits to help alleviate this shortage. ...

29 Poster session: Reconfigurable randomized K-way graph partitioning

Fatih Kocan

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

In this paper, a randomized k-way graph partitioning algorithm is mapped onto reconfigurable hardware. The randomized algorithm relies on repetitive running of the same algorithm with different random number sequences to achieve the (near-)optimal solution. The run-time and hardware requirements of this reconfigurable solution per a random number sequence are O(|V|-K) cycles and O(|V|log|V|+|E|) gates and flip-flops, respectively. Performance is improved further at the expense of more hardware b ...

30 Poster session: An automated and power-aware framework for utilization of IP cores in hardware generated from C descriptions targeting FPGAs

Alex Jones, Prith Banerjee

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Use of hand optimized Intellectual Property (IP) logic cores is prolific in hardware design. While IP cores remain a standard way to utilize the improvement in FPGA technology and contend with time to market pressure through reuse, popularity of tools generating hardware descriptions from high-level languages is also increasing in popularity. PACT HDL combines these two methods within a power-aware framework. The PACT HDL compiler generates power optimized VHDL/Verilog from a C language descript ...

31 Poster session: Power-aware architectures and circuits for FPGA-based signal processing

Frank Honoré, Ben Calhoun, Anantha Chandrakasan

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

This work showcases a power-aware system design methodology for DSP applications on reconfigurable hardware platforms. In particular, an enhanced FPGA architecture is proposed and analyzed for a deep submicron process technology. These enhancements reduce Configurable Logic Block (CLB) usage for distributed arithmetic implementations of signal processing applications by 50% or more thereby reducing the load on interconnect resources. Multi-Threshold CMOS (MTCMOS) circuit design techniques are ag ...

32 Poster session: On computation and resource management in an FPGA-based computation environment

Soheil Ghiasi, Karlene Nguyen, Elaheh Bozorgzadeh, Majid Sarrafzadeh

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract, citings

The idea of managing the comprising computations of an application executed in an FPGA-based system is presented. An efficient algorithm for exploiting the timing slack of building blocks of the application is proposed. The slack of these blocks can be utilized by replacing them with slower but "cheaper" modules and by assigning the computations to the proper resources. Thus, our approach manages the comprising computations and system resources at the same time. This is performed without comprom ...

33 Poster session: On hiding latency in reconfigurable systems: the case of merge-sort for an FPGA-based system

Hossam ElGindy, George Ferizis

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Recursive solutions are effective software techniques that are difficult to map into hardware due to their dependency on input size and data values. As a result, most high-level design tools do not allow for recursive calls. In this paper we present a technique for mapping the merge-sort algorithm, as a case study, into a reconfigurable system. Our mapping employs an on-line prediction method to reconfigure the necessary hardware only when the need arises, and to hide the reconfiguration delay. ...

34 Poster session: Using FPGAs for data and reorganization engines: preliminary results for spatial pointer-based data structures

Pedro C. Diniz, Joonseok Park

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

FPGAs have appealing features such as customizable internal and external bandwidth and the ability to exploit vast amounts of fine-grain instruction-level parallelism. In this paper we explore the applicability of these features in using FPGAs as data search and reorganization engines for performing search and reorganization computations over spatial pointer-based data structures for which traditional computing platforms perform poorly. The preliminary experiments, for a set of simple spatial qu ...

35 Poster session: Recursive circuit clustering for minimum delay and area

Mehrdad Eslami Dehkordi, Stephen D. Brown

February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**

Publisher: ACM Press

Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

We present an effective recursive algorithm for circuit clustering for delay and area minimization, which is applicable to FPGAs. At the highest level of clustering, the circuit is clustered using a modified single-level clustering algorithm. A cluster to netlist transformation technique is proposed, which converts each cluster into a new subcircuit. The algorithm then continues recursively by clustering the generated subcircuits into further levels of clusters. To reduce the amount of node dupl ...

36 Poster session: Track placement: orchestrating routing structures to maximize

routability
Katherine Compton, Scott Hauck
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

The design of a routing channel for an FPGA is a complex process, requiring the careful balance of flexibility with silicon efficiency. With the growing move towards embedding FPGAs into SoC designs, and the opportunity to automatically generate FPGA architectures, this problem becomes even more critical. The design of a routing channel requires determining the number of routing tracks, the length of the wires in those tracks, and the positioning of the breaks on the tracks. This paper focuses o ...

37 Poster session: Implementation of digital fixed-point approximations to continuous-time IIR filters
J. E. Carletta, R. J. Veillette, F. W. Krach, Z. Fang
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

An analytical framework for the implementation of digital infinite impulse response filters in fixed-point hardware on FPGAs is presented. It presumes that a continuous-time filter with the desired response is given. Within the framework, the constant coefficient bit widths are determined by accounting for the sensitivity of the filter's pole and zero locations with respect to the coefficient perturbations. The internal signal bit widths are determined by calculating theoretical bounds on the ra ...

38 Poster session: Customized regular channel design in FPGAs
Elaheh Bozorgzadeh, Majid Sarrafzadeh
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

In this paper, we study the problem of customized regular segmentation design in FPGA routing channels. We propose a deterministic algorithm for segmentation design problem in which each interval is assigned to only one segment (1-Segmentation). We solve the problem of maximum number of incremental track assignment of intervals by mincost network flow technique for 1-Segmentation design. The general K-Segmentation design problem can also be solved by some modifications in our algorithm. We have ...

39 Poster session: Design of a fingerprint system using a hardware/software environment
Lee Vanderlei Bonato, Rolf Fredi Molz, João Carlos Furtado, Marcos Flores Ferrão, Fernando G. Moraes
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Processing system of fingerprint are CPU time intensive, being normally implemented in software. This paper present a new algorithm for fingerprint features localization, that can be easily implemented in hardware (system-on-a-chip, FPGA). This algorithm is composed by 3 stages, first stage read a fingerprint image (255x255pixels, ash tones) and apply a Gaussian Filter, after this, apply a absolute difference mask (ADM) for detector the edges in the image filtered and the last stage look for fin ...

40 Poster session: A granularity-based classification model for systems-on-a-chip

Stephan Bingemer, Peter Zipf, Manfred Glesner
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Field-programmable logic has become an increasingly important technology for the design of digital circuits. One interesting point in the field of reconfigurable logic is its classification within the implementation space of other technologies. Such a classification gains importance if FPGA technology becomes an integral part of Systems-on-a-Chip (SoC). The poster discusses an approach to classify technologies based on their granularity. Therefore, a new distinction into homogeneous and heteroge ...

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41 Poster session: A logic based approach to hardware abstraction

K. Benkrid, S. Belkacemi, D. Crookes
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

This paper presents a novel approach to hardware abstraction based on the logic programming language Prolog. This is an attempt to satisfy the dual requirement of abstract hardware design and hardware efficiency. Central to this approach is a hardware description environment called HIDE, which provides more abstract hardware descriptions and compositions than are possible in traditional hardware description languages such as VHDL or Verilog. HIDE enables highly scaleable and parameterised compos ...

42 Poster session: Making area-performance tradeoffs at the high level using the AccelFPGA compiler for FPGAs

P. Banerjee, V. Saxena, J. Uribe, M. Haldar, A. Nayak, V. Kim, D. Bagchi, S. Pal, N. Tripathi, R. Anderson
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

Applications such as digital cell phones, 3G wireless receivers, and voice over IP, require DSP functions that are typically mapped onto general purpose DSP processors. With the introduction of advanced FPGA architectures which provide built-in DSP support such as the Xilinx Virtex-II, and the Altera Stratix, a new hardware alternative is available for DSP designers. DSP design has traditionally been divided into algorithm development and hardware/software implementation. The majority of DSP alg ...

43 Poster session: FPGA implementation of a fast Hadamard transformer for WCDMA

Sanat Kamal Bahl, Jim Plusquellic
February 2003 **Proceedings of the 2003 ACM/SIGDA eleventh international symposium on Field programmable gate arrays FPGA '03**
Publisher: ACM Press
Full text available: pdf(187.05 KB) Additional Information: full citation, abstract

In code division multiple access (CDMA) systems the base station identifies each user in a cell by unique orthogonal (Walsh) codes. The Walsh codes are generated at the transmitter using a Walsh-Hadamard function. A Fast Hadamard Transformer (FHT) is used at the receiver to decode the transmitted codes. The purpose of this study is to design a FHT which utilizes less hardware resources as compared to the existing designs and also

suggest means for reducing the input length of the Walsh sequence. ...

44 Discovering Gene Networks with a Neural-Genetic Hybrid

Edward Keedwell, Ajit Narayanan

July 2005 **IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB)**, Volume 2 Issue 3

Publisher: IEEE Computer Society Press

Full text available: pdf(1.59 MB) Additional Information: full citation, abstract, references, index terms

Recent advances in biology (namely, DNA arrays) allow an unprecedented view of the biochemical mechanisms contained within a cell. However, this technology raises new challenges for computer scientists and biologists alike, as the data created by these arrays is often highly complex. One of the challenges is the elucidation of the regulatory connections and interactions between genes, proteins and other gene products. In this paper, a novel method is described for determining gene interactions i ...

Keywords: Index Terms- Gene expression analysis, neural networks, genetic algorithms, reverse-engineering, gene interactions.

45 A survey on wavelet applications in data mining

Tao Li, Qi Li, Shenghuo Zhu, Mitsunori Ogihara

December 2002 **ACM SIGKDD Explorations Newsletter**, Volume 4 Issue 2

Publisher: ACM Press

Full text available: pdf(330.06 KB) Additional Information: full citation, abstract, references, citings

Recently there has been significant development in the use of wavelet methods in various data mining processes. However, there has been written no comprehensive survey available on the topic. The goal of this is paper to fill the void. First, the paper presents a high-level data-mining framework that reduces the overall process into smaller components. Then applications of wavelets for each component are reviewd. The paper concludes by discussing the impact of wavelets on data mining research an ...

46 Face recognition: A literature survey

W. Zhao, R. Chellappa, P. J. Phillips, A. Rosenfeld

December 2003 **ACM Computing Surveys (CSUR)**, Volume 35 Issue 4

Publisher: ACM Press

Full text available: pdf(4.28 MB) Additional Information: full citation, abstract, references, citings, index terms

As one of the most successful applications of image analysis and understanding, face recognition has recently received significant attention, especially during the past several years. At least two reasons account for this trend: the first is the wide range of commercial and law enforcement applications, and the second is the availability of feasible technologies after 30 years of research. Even though current machine recognition systems have reached a certain level of maturity, their success is ...

Keywords: Face recognition, person identification

47 Genetic algorithms: Combating user fatigue in iGAs: partial ordering, support vector machines, and synthetic fitness

Xavier Llorà, Kumara Sastry, David E. Goldberg, Abhimanyu Gupta, Lalitha Lakshmi

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available: pdf(342.37 KB) Additional Information: full citation, abstract, references, citings, index terms

One of the daunting challenges of interactive genetic algorithms (iGAs)---genetic algorithms in which fitness measure of a solution is provided by a human rather than by a

fitness function, model, or computation---is user fatigue which leads to sub-optimal solutions. This paper proposes a method to combat user fatigue by augmenting user evaluations with a synthetic fitness function. The proposed method combines partial ordering concepts, notion of non-domination from multiobjective optimization, ...

Keywords: human evaluation, interactive evolutionary computation, support vector machines, synthetic fitness

48 EvoFIT: A holistic, evolutionary facial imaging technique for creating composites

Charlie D. Frowd, Peter J. B. Hancock, Derek Carson

July 2004 **ACM Transactions on Applied Perception (TAP)**, Volume 1 Issue 1

Publisher: ACM Press

Full text available: pdf(2.00 MB) Additional Information: full citation, abstract, references, index terms

EvoFIT, a computerized facial composite system is being developed as an alternative to current systems. EvoFIT faces are initially presented to a witness with random characteristics, but through a process of selection and breeding, a composite is "evolved." Comparing composites constructed with E-FIT, a current system, a naming rate of 10% was found for EvoFIT and 17% for E-FIT. Analysis revealed that target age was limiting factor for EvoFIT and a second study with age-appropriate ...

Keywords: Design, experimentation, human factors

49 Metaheuristics in combinatorial optimization: Overview and conceptual comparison

Christian Blum, Andrea Roli

September 2003 **ACM Computing Surveys (CSUR)**, Volume 35 Issue 3

Publisher: ACM Press

Full text available: pdf(431.84 KB) Additional Information: full citation, abstract, references, citings, index terms

The field of metaheuristics for the application to combinatorial optimization problems is a rapidly growing field of research. This is due to the importance of combinatorial optimization problems for the scientific as well as the industrial world. We give a survey of the nowadays most important metaheuristics from a conceptual point of view. We outline the different components and concepts that are used in the different metaheuristics in order to analyze their similarities and differences. Two v ...

Keywords: Metaheuristics, combinatorial optimization, diversification, intensification

50 Real world applications: Evolving computer intrusion scripts for vulnerability assessment and log analysis

Julien Budynek, Eric Bonabeau, Ben Shargel

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available: pdf(456.56 KB) Additional Information: full citation, abstract, references, citings, index terms

Evolutionary computation is used to construct undetectable computer attack scripts. Using a simulated operating system, we show that scripts can be evolved to cover their tracks and become difficult to detect from log file analysis.

Keywords: agent-based model, hacker, log analysis, script kiddies, vulnerability assessment

51 Genetic algorithms: papers: Credit assignment in adaptive evolutionary algorithms

James M. Whitacre, Tuan Q. Pham, Ruhul A. Sarker
July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary computation GECCO '06**
Publisher: ACM Press

Full text available: pdf(312.46 KB) Additional Information: full citation, abstract, references, citings, index terms

In this paper, a new method for assigning credit to search operators is presented. Starting with the principle of optimizing search bias, search operators are selected based on an ability to create solutions that are historically linked to future generations. Using a novel framework for defining performance measurements, distributing credit for performance, and the statistical interpretation of this credit, a new adaptive method is developed and shown to outperform a variety of adaptive and non- ...

Keywords: adaptation, evolutionary algorithm, genetic algorithm, historical credit assignment, search bias

52 Data stream processing: Adaptive non-linear clustering in data streams

Ankur Jain, Zhihua Zhang, Edward Y. Chang
November 2006 **Proceedings of the 15th ACM international conference on Information and knowledge management CIKM '06**
Publisher: ACM Press

Full text available: pdf(813.29 KB) Additional Information: full citation, abstract, references, index terms

Data stream clustering has emerged as a challenging and interesting problem over the past few years. Due to the evolving nature, and one-pass restriction imposed by the data stream model, traditional clustering algorithms are inapplicable for stream clustering. This problem becomes even more challenging when the data is high-dimensional and the clusters are not linearly separable in the input space. In this paper, we propose a nonlinear stream clustering algorithm that adapts to the stream's evo ...

Keywords: data streams, dimension reduction, kernel methods, stream clustering, stream mining

53 Learning classifier systems and other genetics-based machine learning: Kernel-based, ellipsoidal conditions in the real-valued XCS classifier system

Martin V. Butz
June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**
Publisher: ACM Press

Full text available: pdf(1.66 MB) Additional Information: full citation, abstract, references, citings, index terms

Many learning classifier system (LCS) implementations are restricted to the binary problem realm. Recently, the XCS classifier system was enhanced to be able to handle real-valued inputs among others. In the real-valued enhancement, XCSF applies as a function approximation system that partitions the input space in hyperrectangular subspaces specified in the classifiers. This paper changes the classifier conditions to data hyperspheres and hyperellipsoids and investigates the consequent performance im ...

Keywords: GAs, XCS, function approximation, learning classifier systems, piece-wise linear approximation, radial bases

54 Evolutionary computation and optimization (ECO): An artificial immune system approach to document clustering

Na Tang, V. Rao Vemuri
March 2005 **Proceedings of the 2005 ACM symposium on Applied computing SAC '05**
Publisher: ACM Press

Full text available: pdf(182.87 KB) Additional Information: full citation, abstract, references, index terms

It has recently been shown that artificial immune systems (AIS) can be successfully used in many machine learning tasks. The aiNet, one such AIS algorithm exploiting the biologically-inspired features of the immune system, performs well on elementary clustering tasks. This paper proposes the use of the aiNet to more complex tasks of document clustering. Based on the immune network and affinity maturation principles, the aiNet performs an evolutionary process on the raw data, which removes data r...

Keywords: artificial immune system, document clustering

55 Genetic algorithms: Intelligent exploration for genetic algorithms: using self-organizing maps in evolutionary computation

Heni Ben Amor, Achim Rettinger

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

Full text available: pdf(397.40 KB) Additional Information: full citation, abstract, references, index terms

Exploration vs. exploitation is a well known issue in Evolutionary Algorithms. Accordingly, an unbalanced search can lead to premature convergence. GASOM, a novel Genetic Algorithm, addresses this problem by intelligent exploration techniques. The approach uses Self-Organizing Maps to mine data from the evolution process. The information obtained is successfully utilized to enhance the search strategy and confront genetic drift. This way, local optima are avoided and exploratory power is maintai...

Keywords: diversity, exploration vs. exploitation, genetic algorithm, genetic drift, premature convergence, self-organizing map

56 Learning Classifier systems and other genetics-based machine learning: papers: Hyper-ellipsoidal conditions in XCS: rotation, linear approximation, and solution structure

Martin V. Butz, Pier Luca Lanzi, Stewart W. Wilson

July 2006 **Proceedings of the 8th annual conference on Genetic and evolutionary computation GECCO '06**

Publisher: ACM Press

Full text available: pdf(1.48 MB) Additional Information: full citation, abstract, references, index terms

The learning classifier system XCS is an iterative rule-learning system that evolves rule structures based on gradient-based prediction and rule quality estimates. Besides classification and reinforcement learning tasks, XCS was applied as an effective function approximator. Hereby, XCS learns space partitions to enable a maximally accurate and general function approximation. Recently, the function approximation approach was improved by replacing (1) hyperrectangular conditions with hyper-ellips ...

Keywords: LCS, XCS, function approximation, genetic algorithms, locally weighted learning, recursive least squares

57 Computing curricula 2001

September 2001 **Journal on Educational Resources in Computing (JERIC)**

Publisher: ACM Press

Full text available: pdf(613.63 KB) html(2.78 KB) Additional Information: full citation, references, citings, index terms

58 Facial modeling and animation

Jörg Haber, Demetri Terzopoulos
August 2004 **ACM SIGGRAPH 2004 Course Notes SIGGRAPH '04**
Publisher: ACM Press
Full text available: pdf(18.15 MB) Additional Information: full citation, abstract

In this course we present an overview of the concepts and current techniques in facial modeling and animation. We introduce this research area by its history and applications. As a necessary prerequisite for facial modeling, data acquisition is discussed in detail. We describe basic concepts of facial animation and present different approaches including parametric models, performance-, physics-, and learning-based methods. State-of-the-art techniques such as muscle-based facial animation, mass-s ...

59 Genetic programming: Evolving fuzzy decision tree structure that adapts in real-time
James F. Smith
June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**
Publisher: ACM Press
Full text available: pdf(513.58 KB) Additional Information: full citation, abstract, references, index terms

A fuzzy logic algorithm has been developed that automatically allocates electronic attack (EA) resources distributed over different platforms in real-time. The controller must be able to make decisions based on rules provided by experts. The fuzzy logic approach allows the direct incorporation of expertise. Genetic algorithm based optimization is conducted to determine the form of the membership functions for the fuzzy root concepts. The resource manager is made up of five parts, the isolated pl ...

Keywords: expert systems, fuzzy logic, genetic algorithm, genetic program, resource management, self-morphing

60 Learning classifier systems and other genetics-based machine learning: DXCS: an XCS system for distributed data mining
Hai H. Dam, Hussein A. Abbass, Chris Lokan
June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**
Publisher: ACM Press
Full text available: pdf(481.30 KB) Additional Information: full citation, abstract, references, index terms

XCS is a flexible system for data mining due to its ability to deal with environmental changes, learn online with little prior knowledge and evolve accurate and maximally general classifiers. In this paper, we propose DXCS which is an XCS-based distributed data mining system. A MDL metric is proposed to quantify and analyze network load, and study the balance between network load and classifier accuracy in the presence of noise. The DXCS system shows promising results.

Keywords: MDL, XCS, distributed data mining, learning classifier system

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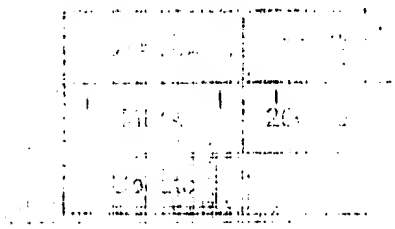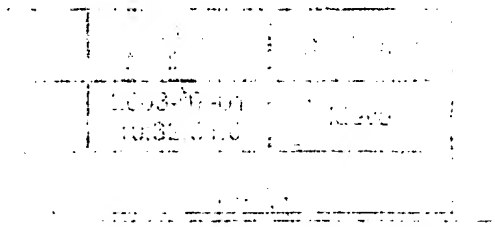
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